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REMARKS

Entry of this Amendment is believed proper since no new issues are being raised which would require the Examiner's further consideration and/or search.

Claims 1-20 are presently pending in this application. Claim 1 has been amended to more particularly define the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Applicant gratefully acknowledges the Examiner's indication that claims 11-17 have been allowed over the prior art of record, and that claims 2-3, 5-7 and 8-9 would be allowable if rewritten in independent form. However, Applicant submits that all of the claims are allowable.

Claims 1, 4, 8 and 18-20 stand rejected under 35 U.S.C. §102(b) as being anticipated by Oozu et al., U.S. Pat. No. 5,801,373.

This rejection is respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention (as defined, for example, by independent claim 1) is directed to a charged coupled-device (CCD) image sensor including at least four charge transfer devices each transferring signal charges in a column direction, a single charge-detecting capacitor

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receiving signal charges at different timings from one another from the charge transfer devices through an output gate to which the charge transfer devices are connected, and a charge-detector detecting signal charges stored in said charge-detecting capacitor.

In a conventional CCD image sensor having four or more charge transfer devices, for instance, charges transferred through two rows of charge transfer devices are separately input into two or more charge-detecting capacitors, and then, output as an image output signal by switching charges transferred through two rows of charge transfer devices. However, even if each of the charge-detecting capacitors receives a same amount of charges therein, voltages of image output signals may be different from one another due to variance in sensitivity of the charge-detecting capacitors and reset noises. Such variance exerts harmful influence on reproducibility of images. (Application at page 9, lines 9-17.)

The claimed invention (e.g., as recited in claim 1), on the other hand, includes a single charge-detecting capacitor receiving signal charges at different timings from one another from the charge transfer devices through an output gate to which the charge transfer devices are connected. This feature is important to no longer require a switch for switching charges, and allows charges transferred through each charge transfer device to enter a common charge-detecting capacitor, ensuring reproducibility of images. (Application at page 9, lines 9-20.)

Additionally, the claimed invention (e.g., as recited in claim 8), includes a second diode row extending between the second and third charge transfer devices, the second diode row including a third group of photodiodes supplying signal charges to the second charge transfer device and a fourth group of photodiodes supplying signal charges to the third charge transfer device, wherein photodiodes belonging to the third group and photodiodes belonging to the fourth group are alternately arranged, and a charge-detecting capacitor receiving signal

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charges at different timings from one another from the first to third charge transfer devices
through an output gate to which the first to third charge transfer devices are connected.

II. THE ALLEGED PRIOR ART REJECTIONS

A. 35 U.S.C. § 102(b) Rejection over Oozu et al., U.S. Pat. No. 5,801,373

The Examiner alleges that Oozu et al., U.S. Pat. No. 5,801,373, (Oozu), teaches the invention of claims 1, 4, 8 and 18-20.

With respect to claim 1, Applicant submits, however, that Oozu does not teach or suggest, "a charge-detecting capacitor receiving signal charges at different timings from one another from said charge transfer devices through an output gate to which said charge transfer devices are connected."

The Examiner in the Office Action alleges that Oozu shows Applicant's "charge-detecting capacitor receiving signal charges... from said charge transfer devices through an output gate to which said charge transfer devices are connected," in the following:

As the scanning circuit, one of or a proper combination of a CCD type shift register, a CCD type transfer gate, a shift register using transistors, and a transfer gate using transistors is used. (Emphasis added.) (Column 16, lines 27-30.)

However, the Examiner fails to address in the Office Action which of the above listed elements of Oozu, i.e., 1) the CCD type shift register, 2) the CCD type transfer gate, 3) the transistor shift register, or 4) the transistor transfer gate, correspond to Applicant's claimed charge-detecting capacitor and output gate.

Nowhere in Oozu is there any teaching or suggestion that the CCD registers of Fig. 37, or the paired upper and lower CCD registers of Fig. 38 transfer their signal charges through an output gate to be received by a single charge-detecting capacitor. Applicant

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respectfully requests Examiner to point out each component of Applicant's claims allegedly taught or described by Oozu in a figure.

With respect to Applicant's claim 8, Applicant submits that the Examiner in the Office Action failed to address and Oozu fails to teach or suggest:

"a second diode row extending between said second and third charge transfer devices, said second diode row including a third group of photodiodes supplying signal charges to said second charge transfer device and a fourth group of photodiodes supplying signal charges to said third charge transfer device, wherein photodiodes belonging to said third group and photodiodes belonging to said fourth group are alternately arranged," and

"a charge-detecting capacitor receiving signal charges at different timings from one another from said first to third charge transfer devices through an output gate to which said first to third charge transfer devices are connected."

Oozu discloses in Fig. 38 that each CCD sensor array, (from Fig. 27), has a pair of corresponding upper and lower CCD registers which respectively store odd and even signals from the CCD sensor array.

FIG. 38 shows still another arrangement. Each sensor array has two, i.e., upper and lower CCD registers which respectively store odd and even signals. Thus, visible R, G, and B signals, and an infrared IR signal are separately read out from the upper and lower registers. (Column 16, lines 51-55.)

Each CCD sensor array comprises a separate corresponding pair of upper and lower CCD registers, i.e., the infrared, red, green and blue CCD sensor arrays each have a pair of corresponding upper and lower CCD registers.

Oozu fails to teach or suggest a CCD sensor array wherein any one of the upper or lower CCD registers of a particular CCD sensor array store signals from a second CCD sensor array. That is, for example, the IR-CCD1 upper register and the IR-CCD2 lower

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register for the infrared CCD sensor array only store signals from the infrared CCD sensor, and not the red, green or blue CCD sensors.

In other words, Oozu fails to teach or suggest, for example, one of the red, green and blue sensor arrays extending between 1) either the upper or lower register of the infrared CCD sensor array, and 2) its corresponding upper or lower register.

Therefore Oozu fails to teach or suggest, "a second diode row extending between said second and third charge transfer devices, said second diode row including a third group of photodiodes supplying signal charges to said second charge transfer device and a fourth group of photodiodes supplying signal charges to said third charge transfer device, wherein photodiodes belonging to said third group and photodiodes belonging to said fourth group are alternately arranged."

Additionally, Oozu fails to teach or suggest, "a charge-detecting capacitor receiving signal charges at different timings from one another from said charge transfer devices through an output gate to which said charge transfer devices are connected." for reasons somewhat analogous to the arguments presented above with respect to Applicant's claim 1.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

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III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-20, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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Donald J. Lecher, Esq.
Reg. No. 41,933
Sean M. McGinn, Esq.
Reg. No. 34,386

McGinn Intellectual Property Law Group, PLLC
8321 Old Courthouse Rd., Suite 200
Vienna, Virginia 22182
(703) 761-4100
Customer No. 21254

CERTIFICATE OF TRANSMISSION

I certify that I transmitted via facsimile to (571) 273-8300 the enclosed Amendment under 37 C.F.R. § 1.116 to Examiner WYATT, Art Unit 2878, on August 17, 2006.



Donald J. Lecher, Esq.
Registration No. 41,933
Sean M. McGinn, Esq.
Registration No. 34,386